where R is the range of temperature, n the land area, φ the latitude, a and b the constants. I have computed the constants from the same data as used by Mr. Tsutsui, and compared the calculated values of R with those observed. I find that there exists no considerable difference between Tsutsui's and mine; but for forty stations between latitude 22° and 45° north (Tsutsui's $a=3.61$, $b=0.67$; mine, $a=4.56$, $b=0.64$, in the case $n=\frac{2A+B}{3}$) the discrepancies between the calculated and observed values are in general ±0.5° and sometimes as great as 1°, while the discrepancies between my calculated and observed values are not greater than 0.7°, the average being ±0.4°.

A COMPARISON OF THE CHANGES IN THE TEMPERATURE OF THE WATERS OF THE NORTH ATLANTIC AND IN THE STRENGTH OF THE TRADE WINDS.

By Commander W. C. HEPWORTH, R. N.

Communicated by the author to the Monthly Weather Review as reprinted from the Report of the British Association for the Advancement of Science, Dublin meeting, 1908.

In order to confine that portion of the inquiry which relates to the trade winds within manageable limits, two representative areas were selected for examination. One of these lies well within the region of the northeast trade wind, and covers an area of 1,000,000 square miles; the other is in the heart of the southeast trade-wind, and covers an area of 1,380,000 square miles. For the former homogeneous averages for a period of five years only are available; but for the latter the results of four hourly observations, extending over a period of forty-five years, have been utilized for estimating normal conditions. Judged by the five years' averages, the northeast trade is strongest in April (13.5 statute miles per hour); relatively strong in February (13.0 miles; in March (12.6 miles); and in May (12.4 miles). It then rapidly declines in strength until August, when its velocity is only 8.2 miles per hour. It is lightest (7.4 miles) in September. From October its strength increases until February. According to the average results obtained for the forty-five years' period mentioned, the southeast trade is strongest, (15.5 miles per hour) in February; relatively strong (15.0 miles) in April and November; also in March and December (14.9 miles). It is at about its average strength for the year (14.7 miles) in January, August, and October. In May it is lightest (13.7 miles), and from that month gradually increases, and is again at its average strength for the year in August. It declines to 14.5 miles in September.

To represent the North Atlantic in a comparison of the changes taking place in the surface temperature of that ocean two zones were selected—the one lying between Florida Strait and Valencia, and the other between that strait and Cape Race. Average results, based on observations extending over a long series of years, show that the temperature of the surface water is lower in February, March, and April than during any other period of the year, and is lowest in March. It is relatively low, as compared with any other months than the above, in January, May, and December, and of these months January has the lowest mean surface temperature, and May the highest. The surface temperature is relatively high in June, October, and November; highest as regards those months in October, lowest in November. It is higher in July, August and September than during any other period of the year; highest of all in August, not quite so high in July as in September, in in the Florida Strait to Valencia zone; but in the Florida Strait to Cape Race zone the mean is found to be the same in these two months. A comparison between results of Atlantic trade-wind volocity in each of the years 1902–1907 and those of North Atlantic surface temperatures for the same period leads to the belief that a relation may be traced between departures from the mean in the velocities of the trades in any one year and deviations from normal in the average distribution of surface temperature in the North Atlantic in the year following. Further, there is some evidence to prove that departures from the average strength of the two trades during a series of months, and at times during even so short a period as one month, are roughly reflected in deviations from normal in the average distribution of surface temperature in the North Atlantic in the corresponding series of months, or month, as the case may be, of the succeeding year, notwithstanding the many causes affecting the temperature of the surface water, which must tend to mask the appearance of any such connection.

A large number of tables and diagrams accompanied this paper.

KASSNER'S METEOROLOGICAL GLOBES.

By Prof. R. DEC. WARD, Harvard University. Dated Cambridge, Mass., Sept. 28, 1908.

Professor Kassner, of the Prussian Meteorological Institute, has recently constructed two meteorological globes which can be highly recommended for use wherever meteorology and climatology are taught. The globes measure about 13½ inches in diameter and show the pressure, temperature, and winds for January and July, on the basis of the latest and most complete data available. The globes are mounted on a wooden base, and a simple and very useful device makes it possible to turn them over, so that when desired, the south polar region is at the top. The price of the globes is 50 marks, with 3 marks additional for packing. They may be purchased of Dietrich Reimer (Ernst Vohsen), in Berlin.

Kassner's globes will unquestionably facilitate and simplify any instruction in which there is need of presenting the broad facts which they so clearly set forth. Every teacher of meteorology has had frequent occasion to regret that the great facts of temperature, pressure, and winds have to be learned from charts which, especially if they are on the Mercator projection, as is so often the case, almost always give the students a distorted or at least an unreal picture of the actual meteorological conditions, as well as of the relative sizes of the zones. A scheme of coloring is used which emphasizes the distribution of pressure and temperature, and the isobars and isotherms are drawn so that important, or critical lines are duly emphasized. The lands are shaded, and the higher elevations are shown in darker shading.

It is to be hoped that Professor Kassner's excellent work on these globes will receive proper appreciation in the United States, and that the globes will find a place in the equipment of many geographical and meteorological laboratories.

LUMINOUS FOG.

George A. Turner, second officer of the steamer *Counsellor*, reports that on Friday, July 24, 1908, when in the Gulf of Siam, latitude 30° N., longitude 103° E., "the steamer past thru a small field of remarkable phosphorescent patches in the form of a kind of vapor lying above the surface of the water in lengths of 500 to 1,000 feet and breadths of 100 feet approximately, and about 15 to 20 feet in depth to the surface of the water. At distances of 1 to 2 miles these 'streaks' appeared like shining silver (no moon shining), and at first were taken to be shoals of fish, but on passing directly thru one it had all the effect of a slight luminous fog. No disturbance or presence of any fish appeared in the water, which is only about 25 to 30 fathoms in depth, and no unusual color appeared in the contents of a draw-bucket taken at the time."

BRILLIANT GULF WATERS.

The following extract was taken from the Tampa, Fla., Times, November, 1908:

A remarkable marine phenomenon was observed by the steamship *Dover*, Capt. Yon A. Carlson, as that vessel steamed to Tampa from Mobile. When at a point 35 miles from Mobile light, at 7 o'clock in the evening